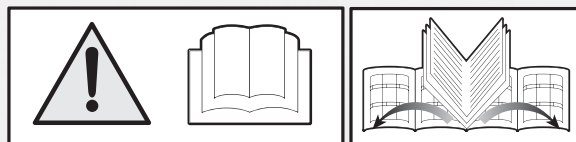


RM

540 gx

Super Rain®



- I Istruzioni d'uso**
Si prega di leggere le istruzioni e di conservarle.
- GB Instruction for use**
Please read and save these instruction.
- F Instruction d'utilisation**
Prière de lire et de conserver.
- E Instrucciones de manejo**
Lea y conserve estas instrucciones por favor.
- D Gebrauchsanweisung**
Bitte lesen und aufbewahren.
- P Instruções de serviço**
Por favor leia e conserve em seu poder.
- NL Gebruiksaanwyzing**
Lees en let goed op deze advizen.
- DK Bruksanvisning**
Var god läs och tag tillvara dessa instruktioner.
- SF Käyttöohje**
Lue ja säilytä.
- S Brugsanvisning**
Beakta säkerhetsföreskrifterna och var rädd om bruksanvisningen.

TABLE OF CONTENTS



SECTION INTRODUCTION

CHAPTER 1 INTRODUCTION

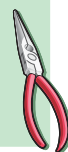
Notices	page	6/44
Legend	page	6/44
Who to contact for a problem	page	7/44
Identification plates	page	7/44
Technical specifications	page	8/44
Specified use	page	8/44
General safety regulations	page	8/44
General safety regulations	page	9/44
Prohibitions	page	10/44



SECTION HANDLING

CHAPTER 2 HANDLING

Transporting the machine	page	12/44
Storing the machine	page	13/44
Used materials	page	13/44



SECTION INSTALLATION

CHAPTER 3 INSTALLATION

Installation instructions	page	16/44
Irrigating on land that is not flat	page	17/44



SECTION OPERATOR

CHAPTER 4 USING THE MACHINE

Operating conditions	page	20/44
Unwinding the hose	page	22/44
Machine drive and speed adjustment	page	25/44
Automatic speed compensation	page	25/44
Fast hose emptying and rewind	page	26/44
Using and regulating the sprinkler	page	26/44
Operating instructions for the VDO digital tachometer	page	27/44
Calibration of VDO instruments	page	30/44



SECTION MAINTENANCE

CHAPTER 5 MAINTENANCE

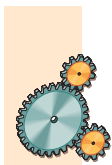
General maintenance regulations	page	32/44
Routine Maintenance	page	32/44



SECTION DIAGNOSTIC

CHAPTER 6 SERVICING

Servicing instructions	page	34/44
Trouble-shooting	page	34/44



SECTION SPARE PARTS

CHAPTER 7 SPARE PARTS

Spare parts	page	40/44
-------------------	------	-------

INTRODUCTION

PART I



NOTICES

This Operating and Maintenance Manual is an integral part of the sprinkler system and must follow the machine whenever sold to another owner or transferred among farms.

The manual should be kept carefully, read and placed readily at the disposal of all persons involved with it. In particular, this manual must be read carefully and fully understood by the machine operators and the people responsible for safety on the farm.

In tune with the overall design of the machine, this manual has been prepared in complete compliance with European Union directives, EEC 89/392, EEC 91/368, EEC 93/44 and EEC 93/68 (Machinery Directives). Furthermore, the manual has been prepared in compliance with the latest regulations and legislation concerning hygiene and safety in the work place published under EEC Directive 89/391.

LEGEND

The symbols detailed below have been adopted in this manual to warn the reader of potential danger to persons or risk of damage to the machine.

There are two types of symbol:

Danger symbols: are triangular and are used when an operation executed incorrectly can cause serious personal injury.

Warning symbols: are round and used to forbid specified operations to prevent the machine malfunctioning.



DANGER

Danger of serious personal injury from moving parts.



DANGER

Generic danger



WARNING

Generic warning

WHO TO CONTACT FOR A PROBLEM

When the need arises, the customer can contact our Technical Assistance Service by calling the following numbers:

In ITALY 0521 872321
from abroad ++39 0521 872321

This service offers the customers the solutions to the various problems that can crop up or will provide an on-site visit by a specialist Service Engineer.

Many technical problems can be solved by very minor service work. We, therefore, recommend reading this Manual carefully before contacting our Technical Assistance Service.

IDENTIFICATION PLATES

Identification plates and stickers are especially important down the years since they ensure that the manufacturer can supply the customer, quickly and correctly, technical information and support services of every kind.

Do not modify or remove the information needed to identify the machine. The actual identification data are indelibly stamped and engraved on a plate. These data comprise everything needed to recognise the machine and should be included in correspondence between the user and the manufacturer-e.g., when asking for Technical Assistance, ordering spare parts, etc.

IT IS ABSOLUTELY FORBIDDEN TO REMOVE OR TAMPER WITH THE IDENTIFICATION PLATE.

The following data are stamped on the plate:

Essential data to be specified in all correspondence between user and manufacturer:

MACHINE MODEL



This identifies the model of the machine, the diameter (in mm) and length (in m) of the hose.

YEAR OF CONSTRUCTION

Specifies the year the machine was built.

SERIAL NUMBER

Specifies the machine's Serial Number.

 	
43010 S. Quirico di Trecasali (Parma) - Italy	
<input type="radio"/>	MACHINE MODEL <input type="text"/>
	YEAR OF CONSTR. <input type="text"/>
	SERIAL NUMBER <input type="text"/>

The machine's Identification plate is located on the right side of the machine (looking at the machine from the front drawbar).

TECHNICAL SPECIFICATIONS

- ENVIRONMENTAL SPECIFICATIONS

- Operating temperature range min. +10°C max. +40°C.

- NOISE LEVEL

Due to its very nature, the machine is not noisy.

- SAFETIES

The machine is complying with European Union Directives:

EEC 89/392 dated 16/6/89; EEC 91/368 dated 20/6/91; EEC 93/44 dated 14/6/93; EEC 93/68 dated 22/7/93 (machine directive); EEC 89/391 (work site safety and hygiene).

- SPECIFIED USE

The RM sprinkler systems: Super-Rain 540 are machines used to irrigate any kind of crop provided they are supplied with water under pressure.

Commissioning and operating the machines is extremely simple. However, for correct use of the machine and fully observance of safety regulations, this manual must be read carefully and fully understood.

We recommend commissioning your machine following the instructions in this manual step by step.

FUNCTIONING

The machine described in these pages is a hose-reel irrigation machine.

It operates by irrigating the soil with jets of water. When the machine is operating, the water is led through a turbine that operates the central motor that rewinds the hose and the return of the rain gun carriage.

GENERAL SAFETY REGULATIONS

Safety warnings and notices, in addition to specific notices, have been used in this manual to call operator and servicemen attention to potential dangers stemming from improper use of the machine.

THE INSTRUCTIONS SUPPLIED DESERVE YOUR COMPLETE ATTENTION AND THE ONE OF YOUR PERSONNEL TOO.

- Follow the safety prescriptions given on the machine and in this manual. Do not modify the safety devices. Use the machine in full compliance with its operating instructions.
- Failure to observe safety prescriptions and/or improper use of the machine can cause serious injury to people and domestic animals or damage to property.
- The instructions and safety notices are not intended to take the place of current safety regulations. They are intended to integrate these latter and encourage their application.
- An efficient machine is a safe machine and hence the importance of following the maintenance schedule meticulously.
- Safety notices do not, by themselves, eliminate danger!
- All the information and notices given in this manual do not refer solely to factory new machines but are usually applicable also to second-hand machines.

GENERAL SAFETY CONDITIONS

When the machine is put on work for the first time and at start up each day, the automatic cycle, the normal work cycle and, in fact, whenever the machine is used, the following general safety conditions must be applied:

- Before starting the machine, read this manual completely and carefully and apply all the safety prescriptions it details.
- Publicise the contents of this manual with all the people who work with the machine and also with those in charge of safety matters in general.
- Observe general work site hygiene and safety regulations, industrial accident prevention regulations and the prohibitions posted by the manufacturer of the machine to protect people from injury and the machine from damage.
- Do not become over-confident in the use of the machine. Always pay complete attention to what you are doing. Before confirming an operation, check to make sure that everything is in perfect working condition.

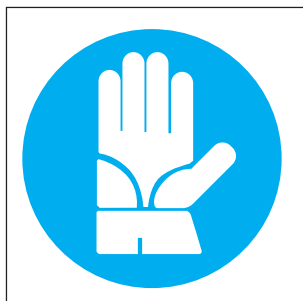
GENERAL SAFETY REGULATIONS

It is very important for the user to observe meticulously all industrial accident prevention regulations. Furthermore, notices should be affixed to the sides of the machine to ensure immediate visual identification of dangerous conditions. These notices should have the following specifications:

TRIANGULAR	To identify danger
ROUND	To identify prohibited/obligatory actions
RECTANGULAR	To give information

PERSONAL PROTECTION EQUIPMENT

When you are working on or near the machine, installing it or during routine maintenance and regulation, observe general industrial accident prevention regulations and, in particular:



Do not work with your bare hands.
Wear adequate gloves.



Wear safety footwear (with steel reinforced toe-cap).

PROHIBITIONS

The following prohibitions must be observed when operating the machine:

- Do not tamper with or cut out safety devices.
- Do not inspect the machine while it is running.
- Do not sit on the protective casings.
- Do not lean on the machine when it is running.
- Do not sit on the components making up the machine.
- Do not use the machine or parts of it for uses other than those detailed in this manual.
- Regulations to the machine must be done by a single person and while the work is under way, unauthorised people must be kept away from the machine.
- Do not modify and/or move parts of the machine.
- Do not add other equipment to the machine.
- Do not use any kind of solvent, such as alcohol, petrol or thinner to clean any surface on the machine.
- Do not allow personnel whose qualification level is different from those detailed in the section on «MACHINE OPERATORS» to perform any kind of work on the machine.
- Keep hands, arms and, in general, all parts of the body, away from moving parts.
- When trouble-shooting and fixing any kind of malfunction on the machine, apply all the precautions described in this manual. These, in fact, are designed to prevent injury to people or animals and damage to property.
- Before beginning any job, concentrate fully on what you are doing.
- Always be very wide awake and ensure that your reflexes are quick and sharp. This is extremely important for the operator.
- Do not operate the machine or its equipment under the influence of alcohol, drugs or medicine.
- Operator clothing must be as suitable as possible. In other words, not too loose nor too tight. Do not wear flapping or dangling items that could become trapped in moving parts.
- Do not wear belts, rings, bracelets, chains, etc.
- This machine must not be used by people with physical handicaps.
- This machine must not be used by people under 18 years of age.
- It is absolutely forbidden to use the rewinding crank handle improperly (before using it, read carefully the instructions on page 22/44 and 26/44).
- Do not aim the sprinkler jet towards roads, railway lines and near high voltage lines.
- During work transfers, do not exceed a speed of 15 km/h.
- Do not use the machine of a gradient of more than 3%.
- Do not disconnect the feed hose when the water is under pressure.



IMPORTANT

RM Spa declines any and all liability for defects, injury to people, damage to property and any loss by failure to observe the safety regulations and prohibitions detailed above.

HANDLING

PART II

TRANSPORTING THE MACHINE

Use adequate steel wires to load or unload the sprinkler machine. Use the specific hoisting lugs (one or two on each side of the machine's chassis).

Follow these steps to hoist the machine:

1. A portal crane or other lifting equipment with adequate lifting capacity should be available so that you can hoist the machine from above.
RM self-propelled sprinklers have not been engineered to be lifted using forklift trucks and therefore, this operation must not be attempted.
2. Hook the machine to the lifting equipment using wires adequate for the weight to be lifted (refer to the Table below).

MACHINE	WEIGHT kg (empty)	WEIGHT kg (water)	WEIGHT kg (with water)
540 (63/175)	650	376	1026

3. Lift the machine up slightly and check to make sure that the load is balanced. In particular, the sprinkler skid **must not be installed** because, if it is, the load will be unbalanced.



WARNING

Hoist the machine only if the angle between the lift wires is less than 40° or 20° to the vertical.

4. When hoisting the machine pay special attention to make sure that the steel wires do not damage the machine. In particular, make sure that the two sides of the hose reel are not squashed.



DANGER

All loading and unloading operations must be done exclusively by expert and authorised personnel.
RM Spa declines any and all injury to people or damage to property caused by incorrect handling of machine parts or their incorrect installation.

STORING THE MACHINE

If the machine is not installed immediately and needs to be stored temporarily, it must be stored in a dry covered place.

DISPOSING OF THE COMPONENTS

The estimated working life of the machine is 25,000 work hours under normal conditions. At the end of the machine's working life, the owner must dispose of it in full compliance with current regulations. First, all lubricants should be emptied out and all the parts cleaned. Then the various materials making up the machine should be separated.

Each type of material can then be disposed of in compliance with the regulations current in the country where the machine is operated in.



WARNING

During disposal, observe all regulations in force in your country. Store polluting material such as oil and solvents in metal containers.

MATERIALS USED IN THE MACHINE:

MATERIAL	USE
PAINTED METAL	Chassis
HOT GALVANISED IRON	Rain gun skid
NICKEL PLATED IRON	Fittings
POLYETHYLENE (PEMD)	Hose
RUBBER	Tyres, sleeves
CAST IRON	Gear unit box, hose slide

INSTALLATION

PART III



INSTALLATION INSTRUCTIONS

1. Before placing the machine on the ground, install the wheels and the drawbar fixing them with the appropriate bolts (pos.2 photo A).

The rear support legs (pos. 3, photo A) must also be inserted in their housings as shown in the figure.

The legs cannot be inserted if the machine has been lowered to the ground.

Once the machine has been towed by the tractor for about 1 km, the tightening performance of the following parts should be checked: wheel retaining nuts, axle fixing bolts.

2. Install the rain gun skid as shown in the photograph. Beforehand, use a file to remove any burrs left by the galvanising process. Put the legs (pos.1 photo C) in their house 7 photo C.

The wheel track (measured between wheel centres) must not be less than 1.4 m. If the carriage is used with a lesser track the stability of the machine could be prejudiced.

3. Pull out about 2 m of hose (pos. 2 photo C). Refer to the section on "USING THE MACHINE" for complete instructions on how to do this.
Couple the flange (pos. 3 photo C) to the carriage, after having inserted the rubber seal.
4. Install the machine's rain gun fixing it to its skid (pos. 5 photo A).
The tapped fitting on the skid carriage must be covered with Teflon or other sealing material before screwing down the rain gun.

Tightening performance on the rain gun must be extremely firm to prevent it from working loose during operation. Tighten it using a socket wrench.

5. Make a preliminary regulation of the rain gun's sector (using pos.4 photo B) and install a nozzle sized for the water supply volume.
6. Bring the sprinkler skid carriage to the disengage bar using the crank handle in the machine's equipment kit (pos. 1, photo D). Check that the stop bar (pos.2 photo E) passes under pos.3 photo E.

At this point, raise the carriage using the mechanical jack (pos.1 photo E).



CAUTION

It is essential when jacking up the carriage to disengage the stop dog that meshes with the reel drive gear (pos. 2, photo D).



DANGER

If the stop dog is not disengaged when the carriage is jacked up, the machine can be severely damaged.

7. Check if the swivel plate locking pin is in its seating (pos. 1, photo F).
8. Check if the stop dog (pos. 1, photo D) is inserted into the reel drive gear.
9. Check the inflation pressure on the machine's tyres. If necessary fill them to the correct pressure of 3 bar = 45 Psi.

10. Check to make sure that one of the couplings on the hose supplied in the machine's kit is compatible with the fittings on the line supply water to the machine.

At this point, the machine can be coupled to the tractor and transported to its work site.



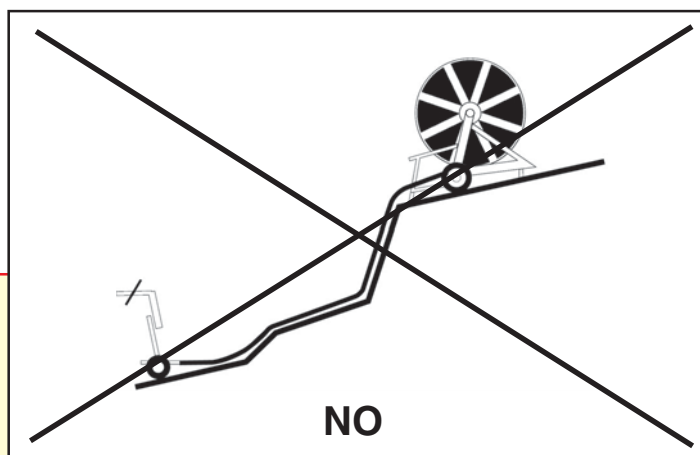
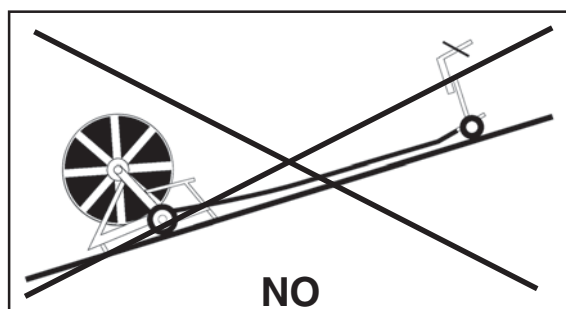
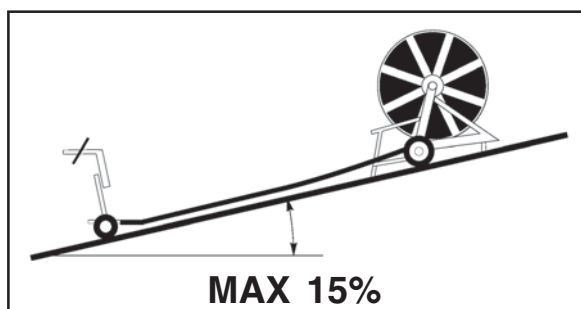
WARNING

RM Spa declines all liability for injury to people or animals or damage to property caused by oversight or improper installation and connection work carried out on the machine.

USING THE SPRINKLING SYSTEM ON LAND THAT IS NOT FLAT

The RM sprinkler is a machine designed to work on flat land but, in exceptional cases, it can be used on hilly land. In this case, a number of conditions must exist:

1. The gradient must not exceed 15%.
2. There must not be large differences in level along the route followed by the rain gun.
3. The rain gun carriage must be perpendicular to the down gradient.
4. The rain gun carriage must be perpendicular to the axis of the reeling in drive motor.
5. The rain gun carriage must always be downstream from the reel carriage;



DANGER

It is absolutely forbidden to work on land with abrupt drops



USING THE MACHINE

PART IV



OPERATING CONDITIONS

1. The machine must be towed by a tractor whose weight is greater than or at least equal to the weight of the machine plus the weight of the water inside the hose. For more details on this refer to the section on "TRANSPORTING AND HANDLING THE SPRINKLER".
2. The Highway Code current in the country of use must be followed whenever the machine is transported on road.

Note that RM sprinkler machines are not certified for on-road operation.

The machine must be fitted with a rear light assembly connected to the tractor's electric system and attached on the back of the machine, i.e. on the rain gun skid carriage.



WARNING

RM Spa recommends all users of its equipment to obtain information on the current Highway Code in force in the country where the machine will be used. RM Spa declines all liability for injury to people or damage to property caused by road accidents.



Tractor speed when towing RM equipment must not exceed 15 Kph. Speed higher than this can cause the sprinkler's tyres to explode with serious consequences for operator safety or that of other users of the road.

3. Water supply to the machine must be done by means of a pressurised water line (*supplied by the mains water supply, a pump connected to a tractor, an electric pump, etc.*).

It is essential that the operating pressure at machine intake is between 3 and 12 bar (pos. 1, photo H) at the volume indicated in the rain gun's user Chart. Pressure must be constant and at full operating volume, must not vary by more than 1 bar.

If the supply water line is subject to the so-called "hammer effect" (*this is often in the case of water company supply lines*), a pressure relief valve set at 11-12 bar should be installed at machine intake.

Failure to take this precaution can cause serious damage to the machine and also be a source of danger to the operator.

It is recommended to check to make sure that the fittings used on the water feed line are good quality. It is absolutely not advised to change the fittings factory installed on the hose with others available on the market.

4. RM sprinkler systems have been designed to have a centre of gravity as low as possible. However, it is good standard practice to pay special attention when operating or simply towing on rough roads, gradients or bad surfaces in general.

It is important to remember that, once the machine has been used for the first time, the water in the hose will not only increase the weight of the machine but also shift its centre of gravity upwards. This means that there is an increased risk of the machine tipping up or over.



WARNING

Do not operate with the machine inclined at an angle on gradients higher than 3%. This is extremely dangerous.

Position the machine at its work area. The sprinkler *will appear as illustrated in Photo A*.
To make it operational, the following steps will be required:

- A. Lower the drawbar support foot and detach the tractor. Check to make sure that the support leg (pos. 9, photo A) is firmly anchored on the ground.

**CAUTION**

The lowering of drawbar support foot has to be carried out by only one person who will have to make sure that no obstacles lie under the bar axle. RM Spa declines all liability for damages occurred in case the above prohibition has not been respected.

- B. Remove the pin on the rotation (pos. 1 photo F) and then rotate the hose wheel by pushing on the back side of the rain gun carriage.

**WARNING**

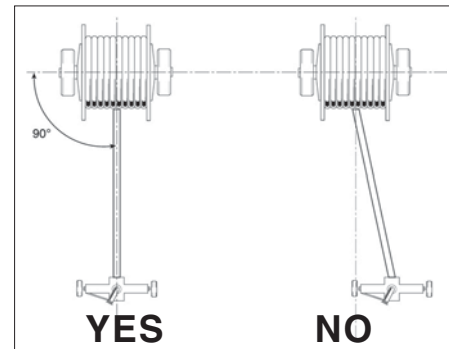
On some models, before turning the turntable, it is necessary to keep away the Bauer plug mounted on the double water inlet.

**WARNING**

On the machines without hydraulic rotation, before keeping away the pin, it is necessary to pay attention to the accidental rotation of the turntable (due to an eventual slope of the machine on a side). In this case keep the safety distance and keep Your body and limbs away from the machine.

Orient the reel for the hose winding so as to have it perfectly in line with the direction to which the hose unwinds; to carry out this operation, use the reel side as reference.

It may happen to unwind the hose on grounds not wholly straight; in any case, it is necessary to have the first 50/60 m of the hose completely in line with the reel (see picture).



- C. After having oriented the reel, secure it by the pin into one of the special stop dogs; to obtain the correct machine inclination use it in one of the reel drive gear positions.

**CAUTION**

After securing the wheel at the desired inclination, make sure that the front end of the rain gun carriage is not too close to one of the two machine tyres since the tyres themselves could be damaged during the following rewinding.

This is mainly recommended for those models where the hose, when completely wound, ends on one of the reel sides. Lower the back support feet to the ground and fix them by the special pins (pos. 3 picture A and pos.2 picture G).

**CAUTION**

The lowering of the drawbar support foot has to be carried out by only one person who will have to make sure that no obstacles lie under the bar axle. RM Spa declines all liability for damages occurred in case the above prohibition has not been respected.

Turn the handwheel (pos. 1 picture G) so as to secure the support foot to the ground.

**CAUTION**

In order to safely anchor it, the surface where the foot rests has to be firm, the land has to be solid.





The support legs must not be cranked down with the handle more than 15 cm. If this has to be done, first change the hole in the bracket.

Regulate carriage track with the fixing bolts (pos. 7, photo C) for the wheel width required (the track must never be less than 1,4 m).

To ensure good rain gun skid carriage return, the hose must always be centred between the two wheels.

Lower the carriage with the wheel on the hydraulic pump (pos. 1, photo E). Check to make sure that the bracket (pos. 6, photo C) is released from the carriage and that the carriage can be towed without bumping into the bracket.



WARNING

If the level difference between the rain gun wheels and the machine wheels is more than 30 cm, the sprinkler machine will have to be repositioned to eliminate this condition. It is also important to check to make sure that the rain gun skid wheels are not in a dip when the carriage contacts the disengage bracket.

Check to make sure that all the operations detailed in the sections above have been executed correctly, the machine is ready to have the sprinkler hose reeled out.

REELING THE HOSE OUT

Follow these steps to reel the hose out correctly:

1. Disengage the ratchet stop dog by turning it 180° counterclockwise (as shown in pos. 2, photo D). To disengage the stop dog easily, turn the PTO slightly counterclockwise with the handle (pos. 1 photo D).
2. Position the gear drive lever (pos. 7, photo H) pulling it towards right (that is towards the trolley pos.4 photo A).
3. Braking function regulation should always be with the handwheel (pos. 6, photo H) with very slight adjustments per time before starting to reeling the hose out.
If it is necessary to do a further adjusting during the hose unwinding, use the same handle, having care not to brake too much.
Completely release the brake at end of unwinding before starting rewinding.
4. Hook up the rain gun trolley chain (pos. 8, photo C) to the tractor.
5. Unreel the hose by towing the rain gun skid carriage in a straight line and, more importantly, at a low speed (max. 3 Km/h).



WARNING

IT IS ABSOLUTELY FORBIDDEN to accelerate abruptly, slow down suddenly or change gear when unreeling the hose.

If this prohibition is not observed, there is a real risk of over-running the hose and breaking it.

Leave at least one and a half turns of hose on the reel. If the machine cannot be seen at the end of the unreeling, have a second operator give a clear and certain signal that the hose is approaching the end of the reel. This will prevent the hose from being detached from the machine.

6. When the hose has been unreeled, before going back to the machine, make sure that the rain gun carriage is correctly positioned (using sectors pos.3 photo B).
7. Reinsert the stop dog turning clockwise (pos. 2, photo D) and make sure that the turns of hose still on the reel are nicely close together (pos. 1 photo L).
If they are not, bring them together and tension them using the crank on the PTO (pos. 1, photo D).

**DANGER**

Do not use this crank when the hose is being reeled in.

**DANGER**

Do not begin to reel in the hose if the turns are not perfectly next to each other on the reel. There is a real danger of getting your hands caught and crushed by the coils. Be extra careful and vigilant whenever working on the reeled in hose.

Completely release the brake using pos.6 photo H.

8. Connect the delivery coupling to the water feed line.
If the fittings are very stiff, lubricate the rubber seal on the ball joint.

You can now feed in the pressurised water supply by opening very slowly the supply valve and accelerating very slowly the feed pump motor.

Wait until the hose fills completely with all the air vented from the water line. Then increase the water supply to the operational level.

Leave the machine with the lever (pos. 7 photo H) in the position used to unreel the hose, carry out a sprinkling cycle without reeling in the hose.

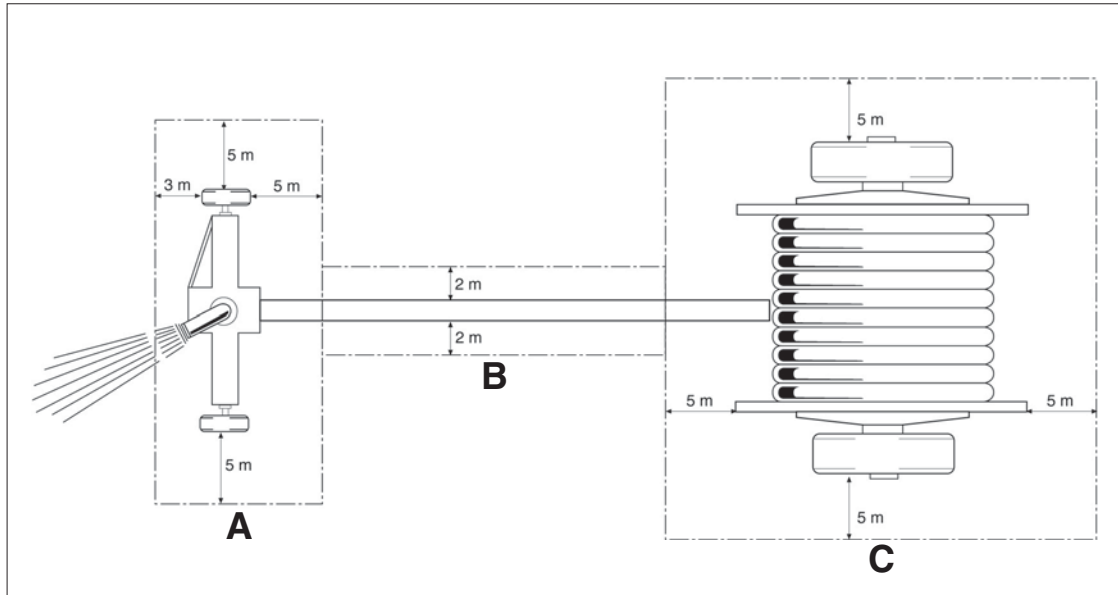
For best results, leave the lever in this position for at least 15 minutes. Then move the lever to the position for reeling in the hose.

**DANGER**

By standers must be kept out of the machine's working range for all irrigation stages.



To give you a clearer vision of what is meant by “safety distance”, the illustration below summarises the distances to be observed during the various stages.



Three operational areas are shown:

- | | |
|------------|---|
| A = | The rain gun carriage: this is where irrigation actually takes place. The minimum distances are 5 m at the sides and 3 m from the back. |
| B = | Hose: the water transfer area is not dangerous but it is best to maintain a safety distance of 2 m. |
| C = | The sprinkler machine: the danger is higher here and a safety zone of 5 m should be maintained around it. |

MACHINE DRIVE AND SPEED ADJUSTMENT

Engage the drive lever (Pos. 7, photo H) by pulling it towards left and use the by-pass to engage the desired drive speed (pos. 3, photo H).

To adjust the speed: slacken off knob (pos. 2 photo H), engage the manual by-pass valve (pos. 3, photo H). Set the speed as required and then re-tighten knob (pos. 2, photo H) to lock the machine at that speed.

If the obtained speed is always too fast or too slow, a further adjusting must be made using the transmission chain positioned under safety cover (pos.14 photo H). For this adjusting stop water feeding to the machine (so that pressure indicated in manometer pos.1 photo H becomes "zero"), brake with the handle pos.6 photo H firmly closing clockwise; open safety protection pos.14 photo H lifting it up. Now, in order to decrease the speed, move the chain pos.9 photo H to the smaller diameter gorge of the pulley no.10 and to that of bigger diameter of pulley no.11 photo H. Do the contrary to increase the speed.



IMPORTANT

ATTENTION! THE ABOVE OPERATION MUST BE MADE ONLY WHEN THE MACHINE IS STOPPED. DON'T TRY TO CHANGE THE CHAIN WHILE THE MACHINE IS WORKING: IT CAN BE DANGEROUS!!

It is good standard practice to make the definitive reeling in rate setting after the lever has been engaged for some minutes (pos. 7, photo H) so that the hose has been pit into traction.

The working pressure and reeling in rate can be read off the instruments on the machine (pos. 1 and 4 photo H). Refer to page 27/44 for instructions on the VDO digital tachometer.



IMPORTANT

When the machine is operated at maximum speed, the load loss inside the turbine increase considerably but this is normal.

AUTOMATIC SPEED COMPENSATION

The machine has an automatic speed compensation system that permits the rain gun carriage to be reeled in at a constant speed throughout the irrigation work.

This regulation is done by means of a control operated by a probe on the hose at the back of the machine and this in turn acts on the main by-pass valves.

A machine with 175 meters of hose set for a reel in rate of 20 m/h must have an irrigation time of 8 h 45.

If there are more hours (10), there is very little compensation and the control lever must be moved upwards using the holes on the lever (pos. 12, photo H). If there are less hours (7), compensation is high and the lever will be moved downwards using the same reference holes.



FAST HOSE EMPTYING AND REWIND

To empty the hose, it should be unwound for not more than 50% of its length following the instructions given in the section on "UNREELING THE HOSE".

Reel the hose back with the PTO (pos. 8 photo H) with the gear unit lever in the disengage position (lever pos. 7 photo 7 towards right) and remove the drain plug on the carriage.

If the drain plug is not installed, remove the rain gun.

The hose must be reeled in exclusively with the PTO running at 540 Rpm at low speed and a sufficiently long PTO shaft for max. 30 Hp transmitted power.

When the rain gun carriage is close to the end travel bracket and the hose reeled out 1 m, it must be reeled in completely with the requisite crank handle (pos. 1, photo D).



WARNING

Reeling in with the PTO shaft will not stop automatically and therefore this operation must be done with the utmost care and attention.

Do not use the crank handle when the hose is reel out for more than 1 m because handle spring back, caused by the elasticity of the hose, could cause serious injury to operator limbs.

USING AND REGULATING THE SPRINKLER

Follow meticulously manufacturer instructions. You will find these in the spare nozzle box.



DANGER

To ensure your safety, do not aim the water jet towards high voltage lines. Always check to make sure that the jet is never directed towards houses, paved roads, electric cabins, etc.

You will be held liable for any damage done if there is a power down or other problems caused by your irrigation work.

OPERATING INSTRUCTIONS FOR THE VDO DIGITAL TACHOMETER

The VDO digital speedometer installed on the machine has been factory programmed. This instrument can read instantaneously the hose rewinding rate and show this on the display as meters per hour.

The display also gives the first decimal for the speed and the current time. Speed range is from 5 to 140 m/h.

This instrument works with a 3V battery (Type CR 2032/Sony) with a working life of around 2 years.

The instrument is automatically switched on when the hose is reeled in or out. To prevent the battery from being run down, the liquid crystal display will automatically switch off about 5 minutes after the machine is stopped.

FUNCTIONS AND OPERATION

ACTUAL SPEED DISPLAY

The digital tachometer displays the temporary rewinding speed. This function is always activated on the **VDO SPRINT** instruments (oval **MODE** key and red round **SET** key) and on the **VDO CYTEC C05** instruments (one key only).

To display the current time with **VDO SPRINT** instruments, press **MODE** key, for at least 2 seconds. With the **VDO CYTEC C05** instruments, press once or more the key to display **CLK**. The display will show the current time, the symbol **CLK** and the temporary rewinding speed.

With the **VDO EURO** instruments (rectangular **MODE** key), the temporary speed is activated only when the symbols **SPD** and **CLK** besides the current time are displayed; if this is not the case, they can be activated by pressing **MODE** key until both symbols are displayed.

The displayed speed is perfectly correct only when the pipe is completely unwound until the last layer; when the pipe is completely wound, the displayed speed is slightly low than the real one.

CHANGING THE BATTERY AND PROGRAMMING THE INSTRUMENT

If the battery has to be changed (display off), follow these steps:

1. Remove the display from its mounting as shown in figure 2. Use your right hand to push the instrument down and use your left thumb to press the black knurled button under the instrument to release it from its mounting.
On VDO Cytec C05 push slightly the head and turn it counterclockwise, then remove the head from its holder.
2. Use a coin to unscrew the battery enclosure cover. Remove the battery and replace it with the new one (Fig.3).
Insert the new battery with the positive pole towards the top and replace the cover. When the battery is changed the data remain in the memory for about 15 seconds.

WARNING! Batteries are special waste material to be disposed of correctly.

3. If the data are cancelled, reprogram the instrument as follows:

VDO EURO AND VDO SPRINT INSTRUMENTS:

Press **MODE** key until the ODO function appears on the display. Press **SET** key for at least 3 seconds. Insert the requisite number for the machine model (see table at page IV.12).

Press **MODE** key to select the first number on the right of the display. Set it with **SET** key. Follow this process for all the numbers until they no longer flash.

On the model **VDO SPRINT**, press again **SET** key for at least 6 times, until the temporary rewinding speed is displayed, then press **MODE** key for at least 3 seconds to display the current time too.



VDO C05 CYTEC INSTRUMENTS:

- 1) Press some times the key to display **ODO** and then press the key for at least 3 seconds.
- 2) Now m/h and km/h are gleaming alternatively; when km/h is displayed, press the key to fix it.
- 3) The instrument is now automatically proposing the programm number (4 digits). The first digit on right starts gliding; when the correct number is displayed, press the key to confirm it. Do the same procedure for all other digits.
- 4) Now the display shows another number (5 digits); repeat the above procedure until all digits are setted on ZERO.
- 5) At the end, take the instrument on **CLK** again by pressing the key.

SETTING THE CLOCK

To set the clock on the model **VDO SPRINT**, press **MODE** key for at least 2 seconds until **CLK** is displayed; press **SET** key for at least 3 seconds, then press **MODE** key again to choose the 12 or 24 hours time and fix it with **SET** key; press **MODE** key until the desired time is displayed; then press **SET** key to fix the exact time.

To set the clock on the model **VDO EURO**, press **MODE** key until the symbol **CLK** is displayed (clock setting); press **SET** key for at least 3 seconds, then press **MODE** key again until the desired time is displayed. Press **SET** key to fix the exact time.

On model **VDO CYTEC C05**, press the key once or more to display **CLK**. To modify the actual time, already displayed, press the key for some seconds until the time only is displayed. Now the digit indicating hour is gliding. When the correct number is displayed, press the key to fix it and repeat the same procedure for the minutes, which have started to glide too. At the end, take the tachometer on **CLK** again by pressing the key.

TROUBLE-SHOOTING THE VDO SPEEDOMETER

Problem: The speed is not displayed or the function symbol ((1)) doesn't sparkles while the machine is working.

- Remedy:**
- a) Check if the wire between the transmitter and mounting has been damaged or broken. Check if it has been crimped.
 - b) Check if the display unit has been pushed all the way down in its mounting to make a perfect contact. Check if the contacts are clean.
For VDO Cytec C05: position the head of the computer on the support and turn until You can hear a "CLICK".
 - c) **For VDO Cytec C05:** check the exact distance between the sensor and the magnet and adjust the distance between them, if necessary.

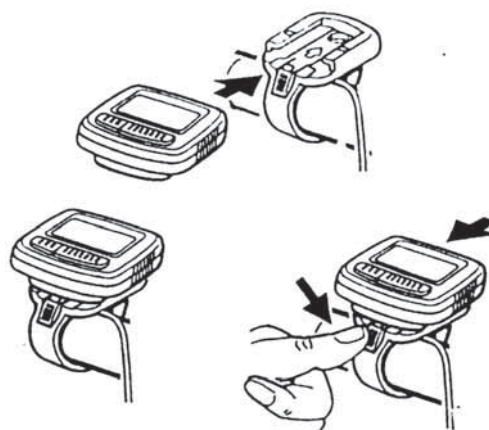
Problem: **Incomplete numbers and letters appear on the display.**

Remedy: Press the AC button on the back of the unit (Fig. 4) to cancel all the settings memorised. Reprogram the instrument following the instructions given above.

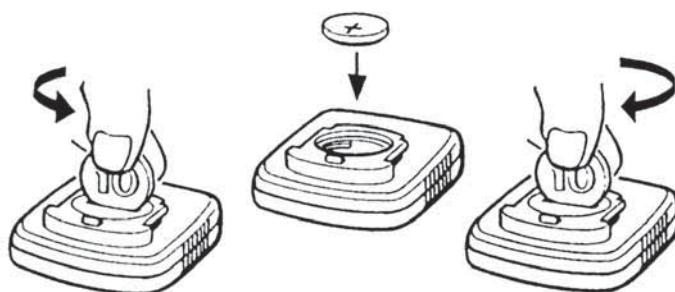
1



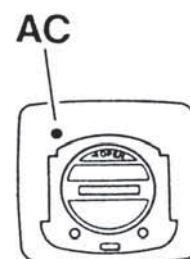
2



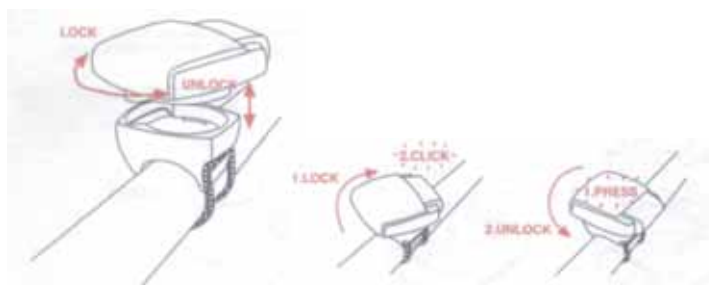
3



4



5



CALIBRATION OF VDO INSTRUMENTS:

Machine	Inside diameter of drum	Calibration with 3 magnets	Calibration with 1 magnet
540	750	2367 (with pulley)	1183
550	870	2126	
560	870	2090	1568
570	1040	2232	1674
580	1240	2730	
581	1240	2730	1618
581 chain	1240		1441
590	1420	2773	
600	1420	2690	1594
600	1320		1553
690 chain	1320		1379
690 chain	1340		1390
690 chain	1420		1415
700	1524	2397	
700	1340	2265	1347
790	1340		1347
800	1700	2591	1541
800	1500	2476	1473
890	1500		1473
890	1700		1541
900	1920	2999	1813
900	1700	2920	1736
990	1700		1715
Major	1480	2788	1659
Major	1540		1680
Major	1620	2870	1708
Major	1700	2920	1736

MAINTENANCE

PART V



GENERAL MAINTENANCE REGULATIONS

All maintenance and repair work must be done by expert and specialist personnel.

All service engineers must work in full compliance with industrial accident prevention regulations. They must wear suitable protective clothing. In this context, refer to the section on "GENERAL SAFETY NOTICES", part of the "INTRODUCTION" to this manual.

MAINTENANCE PLAN

Maintenance to be effected every:	Description	Product to be used
300 h	Greasing of hoseguide screw	Grease for agricultural machinery
300 h	Greasing of rotation's turntable	Grease for agricultural machinery
300 h	Greasing of wheel's housing - water inlet side	Grease for agricultural machinery
300 h	Greasing of teeth welded to the wheel	Grease for agricultural machinery
300 h	Greasing of ratchet stop dog	Grease for agricultural machinery
see manuf.instruct.	Greasing of sprinkler	Grease for agricultural machinery
300 h	Lubrication of by-pass valve's shaft with manual oil feeder	SAE 90EP/PP 80 oil
300 h	Lubrication of transmission side chain between wheel and hoseguide with manual oil feeder	SAE 90EP/PP 80 oil
1000 h and min. every 2 years	Replacement of gearbox oil (check the level every 300 h)	about 6 lt. SAE 90EP/PP80 oil
1000 h and min. every 2 years	Replacement of hydraulic system's oil (only for models with Briggs & Stratton engine with oil tank)	about 12 lt HP68 hydraulic oil
20 h	Turns multiplying oil of compressor for emptying (where mounted)	see table on voice "compressor"

CHECKING OF SCREW COUPLINGS (to be effected with a dynamometrical key)

Coupling	Screw delle viti	Key measurements (mm)	Tightening moment
Tyres nuts (550-560)		19	300 Nm
Tyres nuts (570 -> Major)		27	300 Nm
Screw for fixing of tyres axle		22	150 Nm
Rotation's turntable	M14	22	150 Nm
Screws for fixing of gearbox to the chassis	M10	17	65 Nm



WARNING

CHECK TYRES NUTS AFTER 20 H OF WORK.

SERVICING

PART VI



SERVICING INSTRUCTIONS

During the machine's normal working life, the machine can stop or lose its correct regulated settings. In these situations, follow these steps:

- Refer the matter to an expert service engineer. Only a service engineer can deal with these kinds of problems.
- The service engineer should identify the type of problem from a reading of the pages below on Trouble-shooting the machine. Once the problem is identified, he can find the right solution and put the problem right.



The machine may have problems that are more serious than expected. Once you have identified the problems and checked the solutions offered in the Trouble-Shooting pages below, if the work cannot be done under perfectly safe conditions, refer the matter to your nearest RM Technical Assistance Centre.

TROUBLE-SHOOTING

The following are some typical problems that crop up when the machine is working under normal conditions. Read this section carefully since it will provide useful remedies to solve these kinds of problems.

PROBLEM	<i>When the hose is being pulled by the tractor to unwind it, the hose will not come out.</i>
REMEDY	Disengage the stop dog (pos. 2, photo D) from the chain (Models 700, 800, 900, Major, 890, 990) or from the reel drive gear (Model 550, 560, 570, 580, 590, 600).
PROBLEM	<i>When the hose is being pulled by the tractor to reel it out, there is very strong resistance.</i>
REMEDY	Check if lever (pos. 7, photo H) is disengaged (downs for models 550, 560, 570 and towards the rain gun carriage for all other models), raise the rain gun carriage with the tractor lift so that the weight is on the tractor's rear axle. Disconnect the hose, remove the round plug (if installed on the rain gun carriage). <i>If the resistance is still high:</i> Slacken off the brake even more (handwheel pos. 6, photo H) and reduce the tractor speed to 5 kph.
PROBLEM	<i>The gear unit runs hot during unreeling</i>
REMEDY	Reduce tractor speed to 5 Kpm. <i>A slight heating up of the gear unit box is normal during hose unreeling.</i>
PROBLEM	<i>Water reaches the machine but does not come out of the rain gun or just a small amount does.</i>
REMEDY	Check the pressure on the turbine gauge. It should be at least 4 bar. Try to increase the in-feed water pressure. <i>If the problems persists:</i> Cut off the water supply and check if there are obstructions in the intake line (pos. 13, photo H); check the rain gun nozzle for foreign bodies. It is good standard operating practice to unreel the hose completely (especially when the machine is commissioned or after the winter lay up).
PROBLEM	<i>Water reaches the machine but the turbine does not turn and does not reel in the hose.</i>
REMEDY	Check if the water volume is sufficient and if the pressure (read from the turbine gauge) is over 4 bar, follow the procedures outlined below: A) Operate the turbine by-pass valve (pos. 3, photo H) by pulling it towards the water in-take (pos. 13, photo H): check if the turbine turns normally checking the plastic coupling between the turbine and gear unit. If the turbine turns, go on to point C).

If the turbine does not turn or does so very slowly:

Install a nozzle 2-4 mm larger on the rain gun (pos. 4, photo A). Try again and check the rain gun throw. If necessary try another nozzle to get a better throw (if the nozzle is too big or too small for the water volume, the throw will be shortened. Check on the in-feed gauge (pos. 1 photo H) if the pressure still exceeds 4 bar. If it is less, increase the pressure to reach the optimum level.

B) If the turbine still does not turn:

Detach the water supply line and dismantle the coupling by removing the four screws on the flange (pos. 11, photo H).

Check the small orifice (where the black tapered nozzle is inserted) for foreign bodies. Remove the tapered nozzle and check if the impeller moves easily. To make this check, use a screwdriver to push up the fin you see in the smaller orifice (where the tapered nozzle was seated before). If the impeller does not move, remove the eight Phillips screws on the turbine casing, open the casing and remove the foreign body that is preventing the impeller from turning. If the impeller still does not move, call your nearest RM Technical Assistance Centre.

C) The turbine turns but the machine does not reel in the hose.

Check if lever (pos. 7, photo H) is perfectly engaged (move it a couple of times) and then check if the gear lever is set on one of the four speeds.

Try changing speed with a firm quick movement selecting first one speed and then the others.

Make sure you are not leaving the gear lever between two gear positions.



These operations must be done with the turbine supplied with water under pressure (that is, the turbine is turning).

D) If the turbine turns but the gear unit intake shaft does not move:

Check that the impeller is correctly fixed on the turbine shaft by opening the outside turbine body.

E) The turbine turns but when the reel in is engaged (pos. 7, photo H) it stops:

- if the problem persists even at the first speed, follows the instructions under A) above.
- if the problem continues after these checks, change the nozzle in the turbine with a smaller diameter.

When you are turning the PTO, if the force of the handle decreases in one or two points, this means that the gear unit is damaged. Refer the matter to your nearest RM Technical Service Centre.

To do this: dismantle the in-feed fitting by removing the four screws on the flange (pos. 11, photo H). Remove the nozzle and replace it with one with a smaller diameter (it is normally enough to reduce the diameter by 2-4 mm).

The nozzle used in the turbine is the same type as the one in the rain gun and so check if you already have one in the machine kit. If the one installed in the rain gun is not the same, it can be ordered.

- F) The turbine turns normally but the gear unit stops after a few turns. Follow the steps described under point C):** If the problem remains, cut off water supply, put the gear lever in 4th gear and hold lever (pos. 7 photo H) engaged. Attach the crank to the PTO and turn it counterclockwise for two complete turns. When you are turning the PTO, if the force of the handle decreases in one or two points, this means that the gear unit is damaged. Refer the matter to your nearest RM Technical Service Centre.



PROBLEM REMEDY	<p><i>The machine moves or slides on the ground when reeling in the hose</i></p> <p>Attach the rear support legs better.</p> <p>If this does not work, act immediately with the following procedure:</p> <p>Put the gear lever in 4th (refer to the section "REGULATING REELING IN SPEED"; disengage the stop dog (pos. 2, photo H); open the by-pass valve to slow down or stop the turbine. Do not touch lever (pos. 7, photo H). At this point, the reel will turn in the direction opposite to its reeling in direction. Allow the tension on the hose to slacken off.</p> <p>When the machine stops, reposition the rear brackets but select a spot where the ground is more solid and compact.</p> <p>If necessary, turn the swivel plate to move the reel's axis in line with the hose.</p> <p>When the hose is unreeled for more than 3 hours under particularly damp conditions (rain or very wet ground), when re-reeling it, the hose should be raised above the ground using 10-12 cm thick wooden spacers.</p> <p>This is very important otherwise there is a real risk of the hose breaking and, consequently, irreparable damage to the reel . RM Spa declines any liability for damage caused by failure to observe this standard operating procedure.</p>
PROBLEM REMEDY	<p><i>During re-reeling, the hose is badly reeled or is outside the reel.</i></p> <p>Follow these instructions for perfect re-reeling:</p> <p>Unreel the entire hose (the very first time and thereafter once every four unreeling and re-reeling cycles). If the hose is partially unreeled, check at the beginning of the work cycle to make sure that the coils still on the reel are perfectly placed. It is essential that (for at least 50 m from the machine) that the hose is perpendicular to the axis of the reel. Thus when the hose is reeled out by the tractor, check to make sure this is the case (if necessary, turn the swivel plate to achieve this alignment). It should also be noted that, in the first 20-30 unreeling cycles, hose re-reeling cannot be perfect until the hose has fully adapted to the reel.</p> <p>If the problem is not solved after carrying out the steps outlined above, remove the plastic casing on the side opposite the turbine and with the machine stopped.</p> <p>Count the number of teeth in pinion installed on the wheel shaft and the number of teeth on the pinion on the hose slide shaft. Give these numbers (plus the hose diameter and length) to the RM Technical Assistance Service.</p>
PROBLEM REMEDY	<p><i>The rain gun carriage does not return correctly during rewinding.</i></p> <p>If the wheels of the rain gun carriage tend to lift off the ground during re-reeling (check this 15-20 minutes into the re-reeling cycle), widen the wheel track or add ballast on the sides of the carriage.</p> <p>It is always best to have the rain gun carriage working with the right and left wheels at equal distances with the hose between them.</p> <p>When the rain gun is used on one side, make a slight furrow in the ground in which the hose will be held during rewinding.</p> <p>If the machine is used on hilly land or land that is not completely flat, it is best to place the rain gun carriage on the lower side so that the machine will take in the hose reeling it from above.</p>
PROBLEM REMEDY	<p><i>The hose is oval shaped when the machine is supplied from a well or from the water mains.</i></p> <p>This is caused by two negative effects working together:</p> <ul style="list-style-type: none"> ° the low pressure normally found in this kind of supply source. ° pressure drops in the supply to levels insufficiently high to operate the system. <p>Since we can do nothing to remedy the problem of low pressure main supply, due to the inconstant pressure, the machine should be used at the lowest re-reeling system possible. It is also good practice to leave the stop dog disengaged (pos 2, photo D) to allow the reel to recover partially if there is a drop in supply pressure.</p>

PROBLEM *Re-reeling speed is not constant*

REMEDY It should be noted that the speedometer installed gives an approximate hose re-reeling rate reading with a an error of $\pm 15\%$. The instrument is calibrated on half the entire length of the hose. To solve this problem, use a lower gear unit speed (2nd rather than 3rd) with the same reeling in rate. Then increase the speed of the turbine and use a chronometer to check the actually running speed. If the problem persists, do the compensation procedure described in the section on "AUTOMATIC SPEED COMPENSATION".

PROBLEM *After reeling in three-quarters of the hose, the machine stops.*

REMEDY Check if the gear unit lever is still engaged (pos 7, photo H). If it is disengaged, this means that the safety protecting against incorrect hose re-reeling has tripped.

Check if the hose slide unit has clear signs of malfunction (breaks in the chain, shaft screw worn, etc.).

If everything is fine and the hose is correctly reeled, regulate the safety:

For Model 550: slacken off the clamp halfway along the steel wire and move it 10 mm towards the rain gun carriage. Tighten the clamp back in this new position.

For Models 570, 580, 590, 600GX, 890, 990 lengthen the wire connecting the probe touch the hose with lever (pos. 7, photo H).

To do this, use the register on the cable so extend the wire for about 10 mm (be careful you choose the right cable and not the one that controls the disengage).

For Models 700, 800, 900, Major: bend the end opposite the rubber lever handle (pos 7, photo H) about 40 mm or adjust with the appropriate register.

If the hose is badly wound (the hose touched the frame at the bottom), do not make the registrations described above.

Unreel the hose with the tractor for at least 80-150 m and then do a fast re-reel with the by-pass closed and the gear in 4th.

If this does not solve the problem, contact your nearest RM Technical Assistance Centre.

PROBLEM *On Model 550, 560, 570, 580, 590 and 600GX the manual work with the hand pump to lift up the carriage is extremely difficult.*

REMEDY Remove the ballast from the carriage and check to make sure that the stop dog (pos. 2 photo D) is disengaged when the rain gun carriage is raised or lowered.

PROBLEM *On model 700, 800, 900, Major the hydraulic plant cannot raise the machine when it is full of water. In other words, the wheels do not lower.*

REMEDY Try using a different type of tractor. If the problem persists, change the setting on the relief value on the hydraulic circuit.

Use a socket wrench to remove the outside cap-head screw while holding the inside screw tight with a normal wrench. Then use a hex wrench to screw in the regulating screw at least 4 turns. Replace the cap-screw and try lowering the wheels. If this is not sufficient, repeat the procedure.

PROBLEM *The machine leaks from the hole under the turbine casing.*

REMEDY The mechanical seal is worn or obstructed.

The working life of the mechanical seal inside the turbine can vary from 2000 to 8000 work hours depending on the hardness and cleanness of the water (contact RM Technical Assistance Centre for instructions on how to change the seal).

Note that some leakage through the seal is normal especially during the first working hours (the two contact surfaces forming the mechanical seal have to adapt to each other).

It is good standard operating practice to take action as soon as you note real leaks since in this way you will prevent damage to the turbine.



SPARE PARTS

PART VII



SPARE PARTS

When order spare parts, always specify the following information:

1. The year the machine was fabricated.
2. The machine's Serial N°
3. Diameter and length of the hose installed.
4. Order code Number for the part or an exact description of the part.
5. Short description of the presumed cause of the breakage or the wear.
6. Type of shipping required (parcel post, sea or air freight).



This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Lined area for handwritten notes or calculations.

